

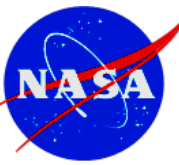
The background is a dark blue space-themed illustration. It features the NASA logo in the top right corner. Various constellations are depicted with white dots and thin blue lines. At the bottom, there are stylized representations of the Earth (left), a blue sailboat (center-left), a large grey moon (center), and a red planet (right).

Development and Initial Validation of HFBP-EM Short-Form Surveys

Suzanne T. Bell, Jennifer C.W. Miller, Sara E. Whiting, Lauren B. Landon,
Sheena I. Dev, Sydney R. Begerowski, Alexa Doerr & Peter G. Roma

Behavioral Health and Performance Laboratory

Human Factors and Behavioral Performance Exploration Measures (HFBP-EM)



HFBP-EM Suite	<i>Physiology/Biomarkers</i>
	Sleep
	Heart Rate
	<i>Individual Behavioral Health</i>
	Personality Assessment
	Social Desirability
	Depression
	Mood and Affect
	Neurobehavioral Function
	<i>Objective Performance</i>
	Cognition
	ROBoT
	<i>Team & Social Dynamics</i>
	Team Performance: MCC Ratings
	Team Performance: Crew Ratings
	Team Cohesion
	Team Processes
	Psychological Safety
	Social Support
	Group Living

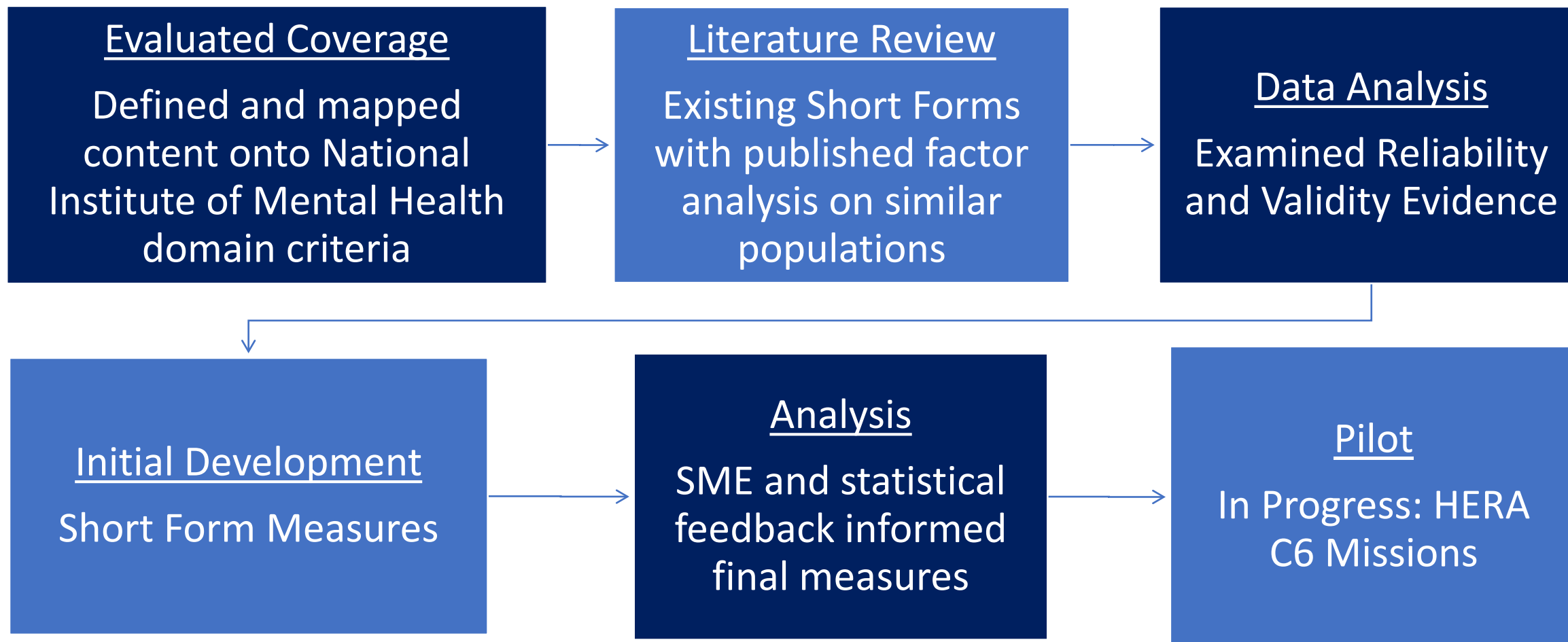
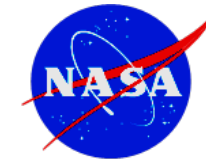
Russian Ground Based Experiment Complex (NEK)

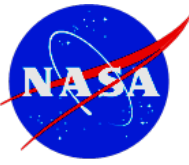


Human Exploration Research Analog (HERA)

Photo credits: NASA,
NEK-IBMP/Oleg
Voloshin

HFBP-EM Short Form Methods





Mood and Affect: Reliability

Profile of Mood States (POMS):

Measures intrapersonal psychological distress

Administered Daily:

Crewmembers rate how well 37 adjectives (e.g., “tense”) describe themselves in that moment on a 5-point scale where 0 = Not at all and 4 = Extremely.

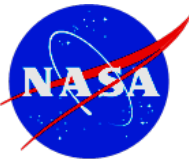
$n = 36$ HERA, 6 NEK
2,128 Data Points Collected

Psychological Dimensions:

- | | |
|--------------------------|--------------|
| • Anger/Hostility | $R_C = 0.79$ |
| • Confusion/Bewilderment | $R_C = 0.50$ |
| • Depression/Dejection | $R_C = 0.75$ |
| • Fatigue/Inertia | $R_C = 0.76$ |
| • Tension/Anxiety | $R_C = 0.73$ |
| • Vigor/Activity | $R_C = 0.75$ |

$$R_C = \frac{[\sigma_{ID * MissionDay}^2 / M]}{[\sigma_{ID * MissionDay}^2] + [\sigma_{ERROR / M}^2]}$$

M = number of items in construct



Mood and Affect: Validity

Response Frequency Analysis

- 11 items with limited range, not all responses options endorsed
- 13 items were selected 4% or less of the time to describe a participant's current mood

Correlations

- 26 items were highly correlated to other dimensions
- 35 items were highly correlated with other behavioral inventories

Confirmatory Factor Analyses Results

Full-length: Nonconvergence

Best Short Form: 6 dimensions with 18 items

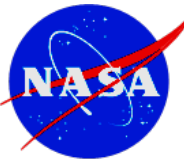
RMSEA = 0.0014

CFI = 0.990

TLI = 0.987

SRMR = 0.065

P-Value = 0.0224



Mood and Affect: Short Form

Subject Matter Experts rated:

- 6 Constructs
- 16 Items
- 4 Proposed Constructs

Example Item Results	Reason
<u>“Tired”</u> rather than “Weary” or “Bushed”	Universal vernacular of Fatigue
<u>“Disengaged”</u> and <u>“Unenthusiastic”</u>	Addressing Depression motivational component

Next Steps

Piloted Surveys
<i>Individual Behavioral Health</i>
Depression
Mood and Affect
<i>Team & Social Dynamics</i>
Team Performance: MCC Ratings
Team Performance: Crew Ratings
Team Cohesion
Team Processes
Psychological Safety





Thank you, Questions?

jennifer.c.w.miller@nasa.gov
suzanne.t.bell@nasa.gov